

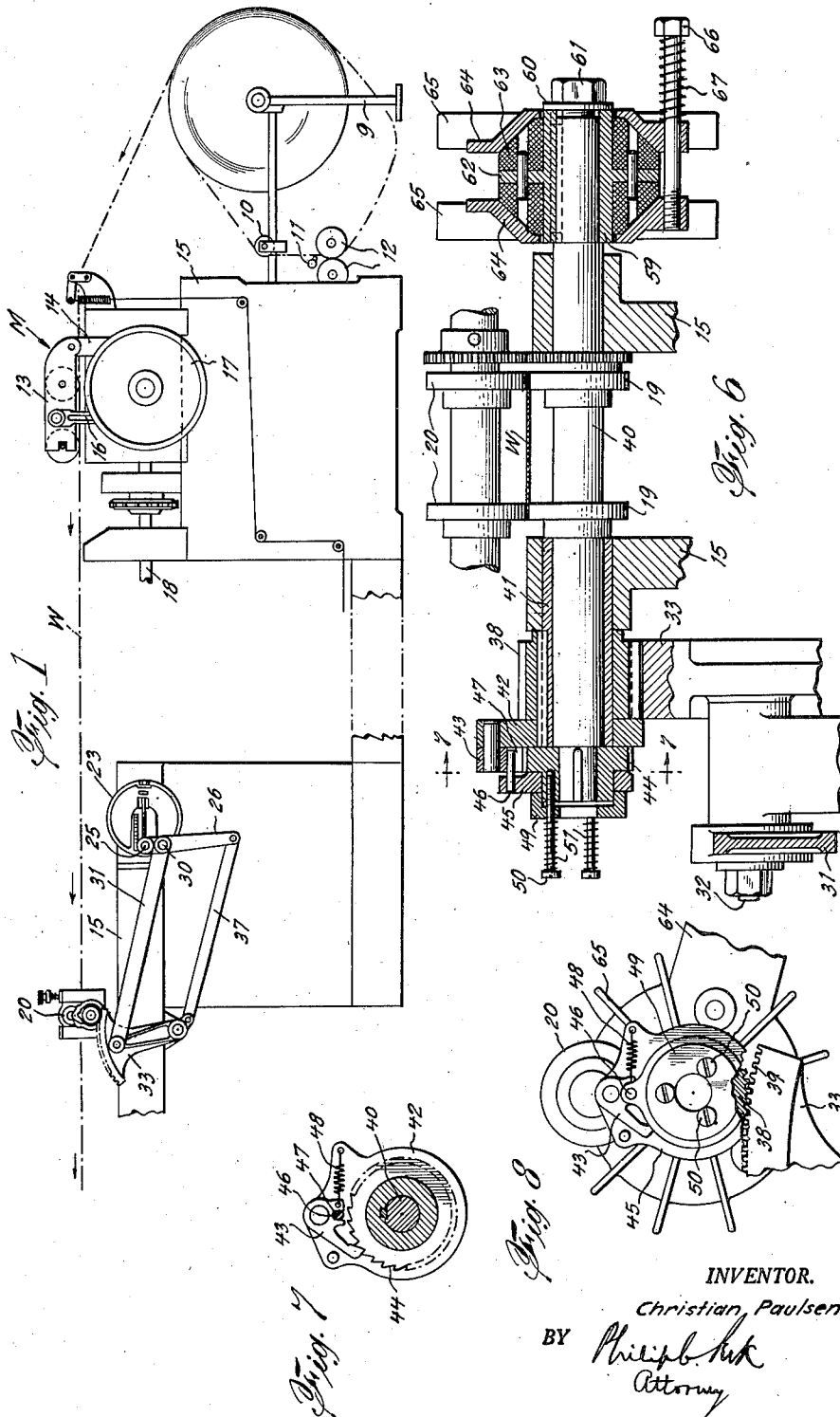
Nov. 27, 1945.

C. PAULSEN FEED MECHANISM

2,389,929

Filed Aug. 13, 1943

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 2

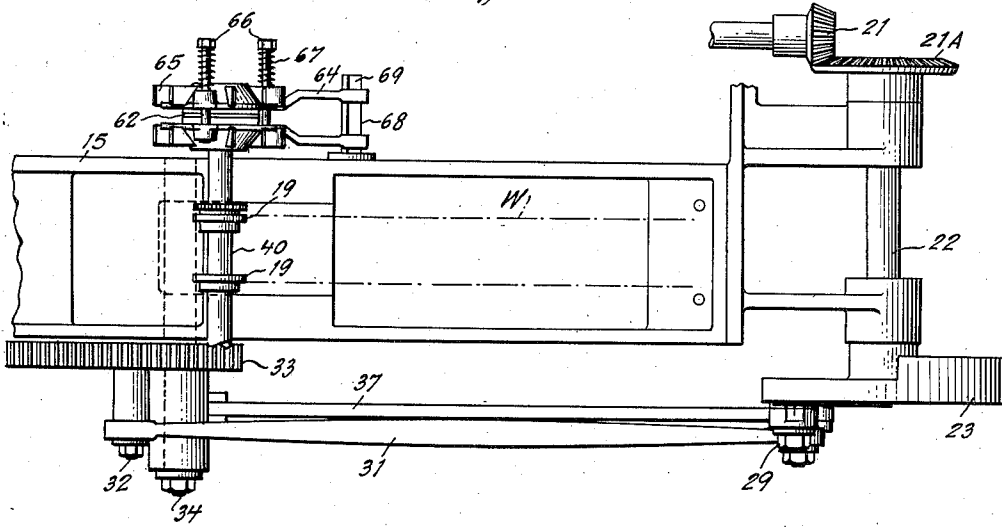


Fig. 3

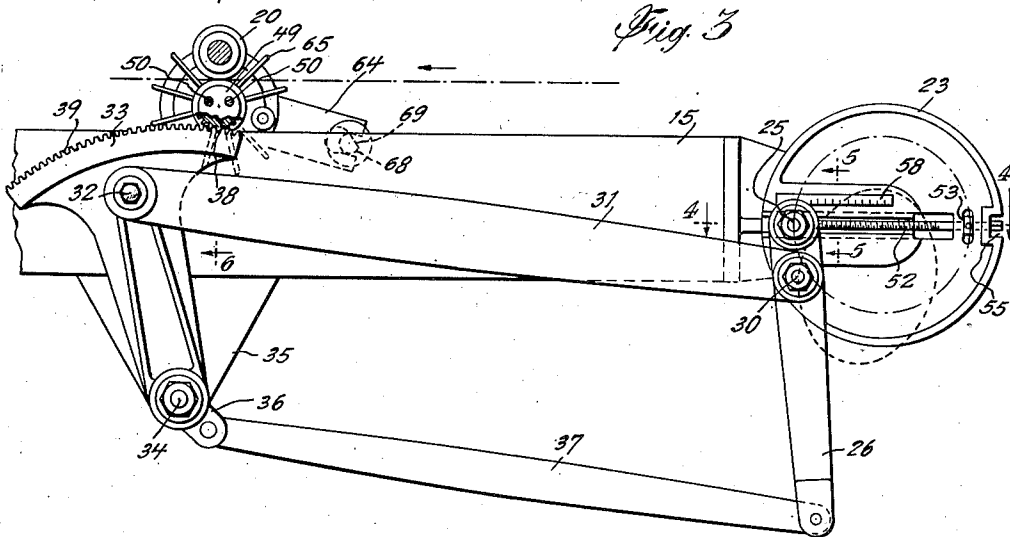
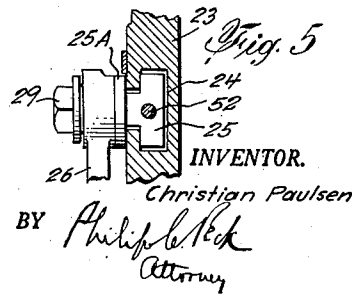
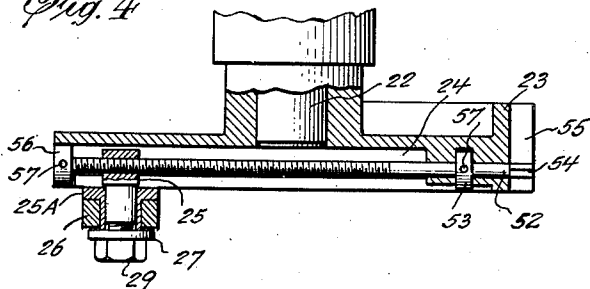


Fig. 4



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2,389,929

FEED MECHANISM

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13 Claims. (Cl. 271-2.6)

My invention relates to feeding mechanisms employed more particularly for flat-bed printing presses for printing webs where good register is required.

According to the usual practice, the web is advanced by a feed roll operated by pawl and ratchet connected with such feed roll, the variable lengths of the feed being obtained through an adjustable feed crank which may be set for any length of stroke within the limits of the press.

However, the common crank motion is not well adapted for present-day high speeds in that the beginning of the feed stroke is too abrupt thereby causing the feed roll to slip on the web at the sudden start, and again toward the finish of the feed stroke the feed roll puts a rather heavy load on the brake that is combined with the feed roll so as to create undesirable heat and wear in the brake on account of such heavy load on the feed mechanism.

The objects of my invention, among other things, are to provide an improved mechanism for feeding the web through the press that will overcome such defects, and to that end I have devised an improved feed mechanism in which high speed is obtained, yet the feed stroke for advancing the web will nevertheless start slowly and also finish slowly so that the danger of slippage and mis-register is avoided and also overheating and wear on the brake are obviated in that less work is placed on the brake to secure accurate stoppage of the feed roll.

I have also provided a new and improved form of brake for the feed roll that is an important departure from common practice by using a brake hub of cylindrical construction combined with brake shoes or clamps that coast with the cylindrical hub. I have found that in use the cylindrical hub wears down faster than the brake shoes, and when this occurs the brake loses much of its ability to bring about proper stoppage for accurate register. My new brake construction overcomes these defects when combined with the feed-roll and feeding devices, since the contact surfaces of the brake are maintained in substantially perfect relation even after long service, and so the danger of irregular wear of the brake parts causing mis-register is avoided.

Other objects and advantages will be hereinafter described and particularly pointed out in the appended claims, and I have shown a preferred embodiment of my invention in the accompanying drawings in which—

Fig. 1 is a side elevation of my feed mechanism connected with a flat-bed printing press printing one color on the upper side of a web, the printing head for the other side being omitted;

Fig. 2 is an enlarged top plan view of the

feed mechanism shown on the left side of Fig. 1;

Fig. 3 is a side elevation of the Fig. 2 mechanism;

Fig. 4 is an enlarged section on the line 4-4 of Fig. 3;

Fig. 5 is an enlarged detail section on the line 5-5 of Fig. 3;

Fig. 6 is an enlarged vertical section on the line 6-6 of Fig. 3;

Fig. 7 is a sectional view on the line 7-7 of Fig. 6; and

Fig. 8 is a detail end view looking from the left of Fig. 6.

Similar numerals refer to similar parts throughout the several figures.

Referring to Fig. 1, the web W of paper in the form of a roll is rotatably mounted on the standard 9, and the web is led from the roll over the idler roll 10 and usual spring-tension roll 11 and then between the feed-rolls 12 rotated in unison by any suitable device. The web W below the feed-rolls 12 hangs in a loop to prevent snarling, and then passes upwardly around the web roll over a spring-tensioned idler roll and then to the left into the zone of the first printing head M for the impression on the top side of the web and then to the second printing head (not shown) for the impression on the under side. Such a flat-bed perfecting press is shown in U. S. Letters Patent No. 2,250,677 granted me July 29, 1941.

The two printing heads are of usual construction and in themselves constitute no part of the present invention. An outline description of the printing head M will suffice for both. The form carrier 13 is pivotally mounted to the brackets 14 carried by the frame 15. The form carrier 13 is connected by the link 16 to the crank 17 that is rotated through gears (not shown) by the drive shaft 18.

Referring to Figs. 1, 2 and 6, the web W is advanced through the press to the left (Fig. 1) by the improved feed mechanism shown at the left of Fig. 1, which comprises the under feed rollers 19 and the upper pressure rollers 20, preferably geared together as shown in Fig. 6, the under rollers 19 being intermittently rotated by the improved feed mechanism which will now be described.

The drive shaft 18 carries the bevel gear 21 meshing with the bevel gear 21A carried by the cross shaft 22 mounted in the frame 15 (Fig. 2), so as to rotate the crank disk 23 secured to the shaft 22 (Fig. 4). Referring to Figs. 2-5, the T-shaped slot 24 cut in the disk 23 carries the feed-adjusting stud 25, the outer end of which carries the bushing 25A on which hangs the feed-adjusting arm 26 held between the washer 27 and bushing 25A by the nut 29 threaded to the outer end of the stud 25 so that the bushing 25A may be clamped tight against the disk 23.

The stud 30 on the arm 26 just below the adjusting stud 25 carries the link 31 which is pivoted on the stud 32 affixed to the feed segment 33 that rocks on the shaft 34 carried by the bracket 35. The lower end of the feed segment 33 is formed with the fork 36 to which is pinned the control link 37 pivotally connected with the lower end of the feed-adjusting arm 26 (Fig. 3). The longer the fork 36 the slower the feed segment will start and stop, and vice versa. The two links 31 and 37 being connected in spaced relation as shown result in the formation of an ellipse for the path of stud 30 (shown by dotted lines on Fig. 3) as the disk 23 makes one turn. By such connection as shown in Fig. 3, this ellipse will be flattened at both ends of the feed stroke because of the compensating action of the fork 36 as a part of the feed segment 33. The distance between the centers of the studs 25 and 30 is calculated to be equal to the distance between the center of the stud 32 and the pitch line on the feed segment 33 so that, for example, a one inch stroke on the crank disk 23 will correspond to one inch on the pitch line of the segment 33. Since the pitch diameter of the feed-roller pinion 38 that meshes with the teeth 39 of the feed segment 33 is the same as the diameter of the under feed rollers 19 (Fig. 6), the forward feed of the web W will correspond to the stroke of the crank disk 23.

Referring to Figs. 6-8, the feed rollers 19 are secured to the cross shaft 40 carried by the frame 15. The left end of the shaft 40 is journaled in the bushing 41, and the pawl disk 42 is keyed to the feed pinion 38 and carries the pawl 43 that engages the feed ratchet 44 in the usual manner. The operating ring 45 encircles the hub of the feed ratchet 44, and carries the pin 46 that engages the slot 47 formed in the pawl 43 (Fig. 7) with the spring 48 pinned to the pawl disk 42 and pawl 43 to limit the play of the latter as it engages the ratchet 44. On the left end of the shaft 40 (Fig. 6), the friction disk 49 together with the operating ring 45 are secured by the screw bolts 50 threaded in the feed ratchet 44. Springs 51 are coiled around the shanks of the bolts 50 to yieldingly press the friction disk 49 against the operating ring 45.

To vary the length of the feed stroke in the rotation of the crank disk 23, I have provided means for shifting the stud 25 in the T slot 24 of the disk 23, best shown in Figs. 3-5: The adjusting screw bolt 52 passes through the collar 53 carried by the disk 23, with the outer end 54 of the bolt 52 squared within the recess 55 cut in the rim of the disk 23 (Fig. 3). The threaded portion of the bolt 52 coacts with suitable threads cut in the stud 25 (Figs. 4 and 5), with the threaded end of the bolt 52 engaging the stop collar 56 carried by the disk 23. Suitable screw pins 57 in the collars 53 and 56 hold the adjusting bolt 52 in any desired position in adjustably securing the stud 25 in the slot 24 determined by the scale plate 58 on the disk 23 (Figs. 3 and 5).

Referring to Figs. 2, 3, 6 and 8, I have shown my improved brake construction mounted on the far end of the feed-roll shaft 40. The brake core 59 is keyed to the shaft 40 and held in position by the washer 60 and nut 61 threaded to the end of the shaft 40. Integral with the core 59 is the circular transverse flange 62 to which is pinned the brake hub 63 (Fig. 6). Enclosing the hub 63 are the two oppositely-disposed friction clamps 64 which have radiating cooling fins 65, the two clamps 64 being cupped angularly to make a surface-to-surface contact with the brake hub

63. I utilize three adjustable screw bolts 66 (Figs. 2 and 6) to hold the friction clamps 64 yieldingly in contact with the hub 63 by coil springs 67 coiled around the shanks of the bolts 66 between the outer clamp 64 and the heads of the bolts 66. By this construction any wear of the contact surfaces will be taken up so as to keep the latter in practically uniform relation. The friction clamps 64 are anchored on the stud 68 carried by the frame 15, such stud 68 having a flat surface 69 (Figs 2 and 3), which may be turned and fastened so as to avoid any backlash in the clamps 64 which otherwise might cause misregister.

In operation with the crank disk 23 in revolution, the first ten to fifteen degrees of this cycle is the most important, since the feed pawl 43 engages the ratchet 44 during this part of the cycle, and the slower the motion at this point, the easier and smoother is the start of feed rollers 19 with the advancing of the web due to the elliptic motion of the stud 30 on the arm 26 and the connection by the pair of spaced-apart links 31 and 37 with the feed segment 33 and fork 36 respectively substantially in the form of a trapezium in a single coacting mechanism for the operation of the segment 33 through the pinion 38, pawl disk 42 to rotate the feed rollers 19 to advance the web. The same relation exists at the end of the feed stroke through this elliptic motion of the stud 30, thereby making less work and friction for the feed roller brake mounted on the far end of the shaft 40 as shown in Fig. 6.

My adjustable feed mechanism herein before described embodies devices whereby the start and finish of the feed stroke occur very slowly, yet the feed mechanism attains high speed with accurate register, and may be used with different types of printing-presses. Various changes in the structural details of this feed mechanism may be made without sacrificing the advantages derived from its use in advancing the web through the press.

I claim as my invention:

1. A feed mechanism for advancing a web of material comprising means for intermittently advancing the web, a single continuously rotating mechanism, and a pair of rigid spaced-apart links each link being directly connected at one end with said web advancing means and also operatively connected at the other end with said rotating mechanism in a single coacting unit for positively effecting a slower movement to said web advancing means during both the beginning and also the end of each operating cycle of said rotating mechanism.

2. A feed mechanism for advancing a web of material comprising means for intermittently advancing the web, a single continuously rotating mechanism, a pair of rigid spaced-apart links each link being directly connected at one end with said web advancing means and also operatively connected at the other end with said rotating mechanism in a single coacting unit for positively effecting a slower movement to said web advancing means during both the beginning and also the end of each operating cycle of said rotating mechanism, and means for varying the length of feed stroke.

3. A feed mechanism for advancing a web of material comprising means for intermittently advancing the web, a single continuously rotating mechanism, a pair of rigid spaced-apart links each link being directly connected at one end with said web advancing means and also oper-

atively connected at the other end with said rotating mechanism in a single coacting unit for positively effecting a slower movement to said web advancing means during both the beginning and also the end of each operating cycle of said rotating mechanism, and means for varying the length of feed stroke according to a predetermined scale.

4. A feed mechanism for advancing a web of material comprising a rotary shaft for intermittently advancing the web, a brake hub mounted on said shaft, a pair of oppositely disposed, spring-pressed friction clamps having their hub-contacting surfaces arranged at substantially right angles to each other to enclose said hub transversely of said shaft for yieldingly braking said web advancing means with a substantially uniform pressure applied to each side of said hub in parallelism with the axis of said shaft, and a common means for adjustably securing both friction clamps to prevent backlash.

5. In a feed mechanism for intermittently advancing a web of material including an intermittently rotating shaft, a braking device therefor comprising a brake hub mounted on said shaft, a pair of oppositely disposed, spring-pressed friction clamps having their hub-contacting surfaces arranged at substantially right angles to each other and enclosing and bearing yieldingly on opposite sides of said brake hub to exert a substantially uniform pressure thereon in parallelism with the axis of said shaft, and means for varying the degree of pressure of said clamps on said brake hub.

6. In a feed mechanism, means for intermittently advancing a web of material, a continuously rotating crank disk carrying a stud, a rigid feed adjusting arm pivoted on said disk stud, a stud on said arm spaced from said disk stud, and a pair of rigid spaced apart links one link operatively connecting said web advancing means with said arm stud and the other link the free end of said arm with said web advancing means to cause an elliptic movement of said arm stud to impart a slower movement to said web advancing means at the beginning and end of the operating cycle of said disk.

7. In a feed mechanism, means for intermittently advancing a web of material, a continuously rotating crank disk carrying a movable stud, a rigid feed adjusting arm pivoted on said disk stud, a stud on said arm spaced from said disk stud, a pair of rigid spaced apart links one link operatively connecting said web advancing means with said arm stud and the other link the free end of said arm with said web advancing means to cause an elliptic movement of said arm stud to impart a slower movement to said web advancing means at the beginning and end of the operating cycle of said disk, and means for shifting said crank disk stud on the disk to vary the length of the feed stroke.

8. In a feed mechanism means for intermittently advancing a web of material, a continuously rotating crank disk carrying a movable stud, a rigid feed adjusting arm pivoted on said disk stud, a stud on said arm spaced from said disk stud, a pair of rigid spaced apart links one link operatively connecting said web advancing means with said arm stud and the other link the free end of said arm with said web advancing means to cause an elliptical movement of said arm stud to impart a slower movement to said web advancing means at the beginning and end of the operating cycle of said disk, and means

for shifting said crank disk stud on the disk according to a predetermined scale to vary the length of the feed stroke.

9. In a feed mechanism for intermittently advancing a web of material including an intermittently rotating shaft, a braking device therefor comprising an angularly-surfaced hub mounted on said shaft, a pair of oppositely disposed friction clamps having complementary angular hub-contacting surfaces arranged at substantially right angles to each other enclosing and coacting with the opposite angular surfaces of said hub to exert pressure thereon in parallelism with the axis of said shaft, and spring-pressed means for holding said clamp surfaces against said hub in yielding contact with a substantially uniform pressure applied to opposite sides of the hub during the operation of the feed mechanism.

10. A feed mechanism for advancing a web of material comprising means for intermittently advancing the web, a single continuously rotating mechanism, and a pair of rigid spaced-apart links each link being operatively and directly connected with said web advancing means and also with said rotation mechanism to form therewith substantially a trapezium, said links and their said connections being actuated in a single cycle by said rotating mechanism for positively effecting a slower movement in both directions to said web advancing means during both the beginning and also the end of each operating cycle of said rotating mechanism.

11. A feed mechanism for advancing a web of material comprising means for intermittently advancing the web, a single continuously rotating mechanism, a pair of rigid spaced-apart links each link being operatively and directly connected with said web advancing means and also with said rotating mechanism to form therewith substantially a trapezium, said links and their said connections being actuated in a single cycle by said rotating mechanism for positively effecting a slower movement in both directions to said web advancing means during both the beginning and also the end of each operating cycle of said rotating mechanism, and means for varying the length of feed stroke.

12. A feed mechanism for advancing a web of material comprising means for intermittently advancing the web, a single continuously rotating mechanism, and a pair of rigid spaced-apart links each link being operatively connected with said web advancing means and also with said rotating mechanism to form therewith a single coacting unit for positively effecting a slower movement in both directions to said web advancing means during both the beginning and also the end of each operating cycle of said rotating mechanism.

13. A feed mechanism for advancing a web of material comprising means for intermittently advancing the web, a single continuously rotating mechanism, a pair of rigid spaced-apart links each link being operatively connected with said web advancing means and also with said rotating mechanism to form therewith a single coacting unit for positively effecting a slower movement in both directions to said web advancing means during both the beginning and also the end of each operating cycle of said rotating mechanism, and means for varying the length of feed stroke.